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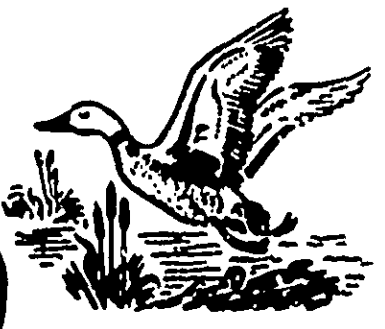

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EFFECTS OF WATER MANIPULATION ON WATERFOWL PRODUCTION AND HABITAT

by

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TECHNICAL PAPER 7

PRESENTED AT
ANNUAL MEETING OF
THE CENTRAL MOUNTAINS AND PLAINS SECTION OF
THE WILDLIFE SOCIETY

Pingree Park, Colorado
August 15, 1966

EFFECTS OF WATER MANIPULATION ON WATERFOWL PRODUCTION AND HABITAT

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INTRODUCTION

Nesting and brood observations on the Monte Vista National Wildlife Refuge, correlated with records on water availability, suggest that high waterfowl production occurs when water is abundantly available before the spring migration. Conversely, if water is not available until after the spring migration, low production can be anticipated.

To test the above hypothesis, two areas on the Monte Vista National Wildlife Refuge were selected for study. The following variables were considered to be similar on the two study areas: size of area, topography, climate, interspersion of cover and water, water levels, previous land use, development, previous nesting effort, grazing intensity, and vegetative composition.

Therefore, all important factors that are known to contribute to "waterfowl breeding potential" were similar on each study area. The variable studied was the time that water was available on the study areas and its effect on waterfowl ecology and vegetative succession.

ACKNOWLEDGMENTS

The project was financed by the Bureau of Sport Fisheries and Wildlife, Region II, Branch of Wildlife Refuges. The Colorado Cooperative Wildlife Research Unit, under Dr. Fred A. Glover, administered the study. The Monte Vista National Wildlife Refuge, Mr. C. R. Bryant, Refuge Manager, was responsible for the costs of this paper.

OBJECTIVES OF THE STUDY

The study was designed to investigate the following on each study area:

A. Number of breeding birds, nesting ecology, brood sizes, total production, and the relationships between these factors for all important species of waterfowl;
B. Changes in vegetation resulting from flood irrigation at different times of the year;
C. The cost of water and its application.

The study was initiated in January, 1965. Approximately twelve months, from March through August of 1965 and 1966, were devoted to

full time field investigation. The analysis of data was done during the winter months. This study represents the first 2-year segment of a continuing 6-year project.

METHODS

Experimental Area

In late March pump water was supplied to the experimental area. This was approximately two weeks before the peak of the spring migration for the early migrating mallard (Anas platyrhynchos) and pintail (Anas acuta). Water flowed across the habitat and was allowed to collect in the barrow pits and low areas.

Control Area

In early May canal water was used to flood across the habitat on the control area and collect in the barrow pits. This was about two weeks after the migration peak for early migrants but before significant nesting had begun. The early migrants made up approximately 70% of the resident breeding population.

Water levels on both areas were maintained by flood irrigation within ± 0.15 feet throughout the nesting and brood season.

Waterfowl Ecology:

Migration, nesting, renesting peaks and resident population estimates were obtained from weekly censuses conducted at sunrise. An intensive nest search along transect lines was conducted to yield information on nesting ecology and production. All (46) transects were spaced 300 feet apart. Twenty-eight were laid out in a north-south direction and 18 in an east-west direction. All transects were 16.5 feet wide which gave approximately an 11% sample of each study area. The transects were run at 27-day intervals throughout the nesting season.

Data concerning brood sizes, survival rates, age classes, and species composition were obtained by counts at four to five-day intervals throughout the summer.

Vegetation Studies

Three separate, but closely related, studies were initiated to detect and measure changes in vegetation as a result of flood irrigation at different times:

A. Systematically placed, square-yard quadrats allowed changes in percent cover, height, and species composition of the vegetation to be studied each year;

B. Square-yard quadrats placed in stratified random clusters allowed changes in specific types of vegetation to be accurately studied;

C. Elevated, color photos taken from an elevated platform truck enabled trends in vegetative succession to be pictorially recorded each year.

Economic Considerations

Economic considerations are important if early flooding is proven to be valuable as a management procedure. Data regarding costs of water were obtained from bills sent to the Refuge. The amount of water for each study area was determined by inspection of rectangular weirs and Parshall flumes. Data concerning man-hours of labor spent checking and applying water and depreciation on equipment were recorded.

Computer Analysis of Data

In view of the vast amount of data collected on the vegetation and waterfowl nesting studies and the fairly complex statistical methods being used, the analysis of data was greatly facilitated by computers. The vegetation data are being analyzed on an IBM 1401 electronic digital computer using MEDCOMP and CSU "canned programs" and programs written by the author in AUTOCODER. FORTRAN II for the IBM 1620 and AUTOCODER (1401) programs for the analysis of the production data are being planned.

The analysis of data using computer facilities will be especially valuable at the end of the study when six years of data are available.

RESULTS AND DISCUSSION

All data from the experimental area and the control area were kept and analyzed separately. The results presented in this paper are preliminary, pending complete and final analysis of data.

Waterfowl Ecology

Total production on the experimental area was significantly greater than production on the control area for both years (Table 1). Breeding pair data indicated a larger breeding population in 1966 than in 1965.

Table 1. Class IIc and III production per acre for the experimental and control area in 1965 and 1966, Monte Vista National Wildlife Refuge, Colorado.

Year	Experimental Area	Control Area
1965	3.1	1.2
1966	4.1	1.4

Average nest success for 1965 and 1966 was found to be approximately 60% (Table 2). Black-billed magpie (Pica pica) appeared to be the most important nest predator on the area.

Table 2. The fate of nests found on transects in 1965 and 1966, Monte Vista National Wildlife Refuge, Colorado.*

Species	1965		1966	
	No. Nests	Percent	No. Nests	Percent
Successful	21	57	29	62
Destroyed	8	22	9	19
Flooded	6	16	5	11
Deserted	2	5	4	8
Total	37	100	47	100

*Data from the experimental and control areas were combined.

Data regarding size and species composition of the resident breeding population as determined by breeding pair counts and by nesting data were closely related both years. Nest concealment was found to be closely related to nest success each year. Well concealed nests tended to be much more successful than poorly concealed nests.

Percent acreage-use ratios indicate nesting ducks preferred rush (Juncus balticus) or a combination of rush and greasewood (Sarcobatus vermiculatus) in which to build their nests.

Vegetation

Vegetation at the time the study was initiated consisted primarily of greasewood and saltgrass (Distichlis stricta) on the slightly upland areas while rush and sedges (Carex spp.) dominated the more moist sites.

The analysis of 1965 data indicate statistically significant decreases in saltgrass and bare ground on both study areas. Grasses, primarily foxtail barley (Hordeum jubatum), and forbs increased due to early flooding. Data collected in 1966 indicates increases in cattail (Typha latifolia) and spikerush (Eleocharis spp.) in small stands on both areas. Although quantitative data do not show a change in greasewood; the result of a visual analysis of the elevated, color photo data show a fairly small (about 10%) amount of the greasewood is dying.

Economics

Average total costs amounted to $1.12/acre on the experimental area compared to $0.38/acre on the control area. These figures include costs of water and its application, including labor.

SUMMARY

Present data indicate waterfowl production on existing areas can be increased by the application of water before the spring migration. By figuring the difference in production and costs between the two areas, it appears that approximately 2.3 ducks per acre can be produced at a cost of $0.32 per duck. These estimates are over and above production and costs on the control area.

Flood irrigation on the study area apparently tends to replace low-growing saltgrass communities with rush and other plant species that provide more desirable nesting habitat for waterfowl.